FOREST PEST MANAGEMENT
Pacific Southwest Region

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3420 Pest Management Evaluation
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BIOLOGICAL EVALUATION OF EL CAMINO PINES AND ST. NICHOLAS - TWO ORGANIZATION CAMPGROUNDS ON THE MT. PINOS RANGER DISTRICT, LOS PADRES NATIONAL FOREST

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ABSTRACT

A tour of the grounds of two organization camps revealed four pest problems: Annosus root disease caused by Heterobasidion annosum, dwarf mistletoe infections, Armillaria root disease caused by Armillaria sp., and bark beetles. These, along with hazard tree management, are discussed in respect to management alternatives.

INTRODUCTION

On May 26, we accompanied Dave Schreiner, Silviculturist, Los Padres National Forest, and Tim Sutton, Resource Officer, and John Kelley, Forestry Technician, Mt. Pinos Ranger District, on a tour of two organization campgrounds on the Mt. Pinos District -- El Camino Pines and St. Nicholas. Both areas are highly developed with facilities for group living, food service, education, recreation, and religious services. Because of heavy use, management to maintain and enhance the health and vigor of the vegetation is mandatory.

OBSERVATIONS

Dominant vegetation in the two areas is composed of Jeffrey pine, ponderosa pine, black oak, canyon live oak, pinyon pine, and a small number of white fir. Pest conditions found were primarily western dwarf mistletoe (Arceuthobium campylopodum), annosus root disease (caused by Heterobasidion annosum), Armillaria root disease (caused by Armillaria sp.), and minor amounts of true mistletoe and bark beetle activity.

Dwarf mistletoe occurs on Jeffrey pine throughout the two areas. In El Camino Pines, dwarf mistletoe ratings are primarily 2's and 3's by the Hawksworth system. Near the chapel however, are several pines infected at the 5 and 6 level. The Jeffrey pine west of the chapel also are heavily infected. A number of black oaks occur in this area.

Some open areas of St. Nicholas have been planted to Jeffrey pine. Unfortunately, the adjacent overstory frequently contains dwarf mistletoe and provides a source of future infections as the seedlings grow into larger targets for the falling mistletoe seeds.

Upon entering the general camp area, the road forks and an access loop is formed. A large opening in the overstory occurs on both sides of the road at the fork. Conks of H. annosum were found in two large pine stumps. Additional openings to the north were suspicious, but conks were not found; the stumps were either too old or too new. Regeneration was sparse or absent, and recent seedling or sapling mortality was seen in only one of these openings.

Armillaria root rot appears to be active in the area west of the chapel in El Camino Pines. Several oaks are dead or dying and 14 adjacent pines, 5 to 25 ft in height, also are dead. Zone lines and mycelial mats were found, but rhizomorphs and remains of the mushrooms were not.

Bark beetle activity was minimal. The tops of 4 pines near the St. Nicholas water tank were dying. Given 300 sq. ft. BA/ac. and recent soil moisture levels, this is not an unusual level of activity. Limited tree mortality within the camps was associated with paving and parking areas. More extensive mortality was occurring up the mountain side southwest of St. Nicholas. This may portend events within the overstocked areas of the campgrounds.

DISCUSSION

1. Dwarf Mistletoe. Almost all of the Jeffrey pines within the area of dwarf mistletoe infestation are currently infected by this parasite. Individual mistletoe ratings (Hawksworth System) for most trees ranges from moderate to severe, which means these trees are under significant stress. These trees cannot be expected to live for nearly as long as healthy trees because severely infected trees are prime targets for bark beetle attack and colonization and are often the first trees to die during periods of drought. Our impression is that dwarf mistletoe has been left uncontrolled for many years in these two organizational campgrounds that some areas are beyond help except to eliminate the existing Jeffrey pines and start over. In some of the other areas, selective tree removal and pruning would be effective and beneficial. Dwarf mistletoe control will be discussed more fully in alternatives section.

2. Annosus Root Disease. Annosus root disease is restricted to certain limited locations (centers). Prevention provides the best opportunity to maintain this level. The application of borax (sodium tetraborate decahydrate, EPA Reg. No. 1624-94) to conifer stumps immediately after trees are cut is the most effective method to prevent infection by the fungus.

In these centers, oaks or other non-hosts can provide cover. With some preliminary horticultural work, small native oaks and other vegetation could be moved by tree spade to the centers such as the one at the entrance fork. This would be successful only if irrigation can be provided during the period of establishment. Once growth has indicated a successful transfer, 1 to 3 years, irrigation could be gradually eliminated. Personnel on the San Gorgonio Ranger District, San Bernardino National Forest, are experienced in this type of vegetation manipulation and could provide advise on pitfalls.

3. Armillaria Root Disease. The fungus Armillaria sp. is commonly found in association with oaks. It becomes pathogenic only when oaks begin to decline. It can become pathogenic on living conifers, when the conifer root make contact with declining or dead oak roots. Spread is through contacts between healthy and infected roots. Infection of living conifers is often associated with stress brought on by drought, defoliation, or other factors.

Younger conifers are susceptible to mortality because the fungus can advance rapidly to the root collar, where it girdles and kills the tree. In older trees the advance is frequently checked, but the fungus continues to function as a decay organism in the roots and butt. The ensuing structural weakness frequently predisposes the tree to windthrow[1]. The hazard presented by such trees often is difficult to recognize.

4. Bark and Engraver Beetles. These insects cause top-kill or mortality of conifers stressed by many factors including dwarf mistletoe, root disease, overstocking, or construction disturbance such as installing parking or severing roots in sewer installation. Thinning offers a way of reducing the risk of attacks in overstocked areas for a decade or more. Further entry will be eventually necessary to maintain healthy stands capable of absorbing recreation use impacts. Whenever any live or recently dead conifers are cut in developed sites, treatment with borax would preclude the stumps as an avenue of annosus root disease introduction. The purpose of using this prevention measures is to confine annosus root disease to those centers where it is already established.

Green pine slash which is over three inches in diameter should be treated to make it unsuitable for breeding by pine engravers, Ips spp. Chipping is the most thorough means of treating slash, and the expense can be partially offset if the chips are a desirable way to mitigate the effects of soil erosion or compaction. If chipping is not feasible, all stems and branches over 3 inches in diameter may be moved at least 1/4 miles from the trees of the recreation area. At this point the slash should be treated by lopping and scattering, or other methods unsuitable to campgrounds, in order not to transpose a problem from one site to another.

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1. USDA-Forest Service. 1978. Diseases of Pacific Coast Conifers. Agr. Hdbk. No. 521. 206 p.

Protective insecticide treatment is possible for the retention of highly valuable conifers. Two formulations of carbaryl insecticide (Sevin 50W and Sevin 80S) are registered for use on pines to prevent attacks by bark and engraver beetles. A single application to the main stem by hydraulic sprayer from the ground will prevent most attacks for up to a year. If the insecticide

is applied in response to a temporary reversible stress, such as drought or construction disturbance, it could be considered a logical part of an integrated pest management program.

5. Hazard Tree Management[2]. The overstory vegetation appears to be in good condition. There were no obvious hazards in the areas observed, although trees rising through cuts in the eaves of buildings could present an eventual problem. Nevertheless, a hazardous tree management program should be initiated, if not already underway, with the objective of reducing the number of tree hazards to an acceptable level, thereby reducing the probability of property damage and risk to public safety. Such a program would require an initial inspection to determine the locations of hazardous trees and to prescribe any actions necessary for hazard reduction. In most cases, this would be tree removal, but other measures, such as topping, pruning, bracing, and relocating improvements, may be appropriate depending on the specific situation. This inspection and any actions taken should be documented.

Once initiated in an area, a hazardous tree management program should be a continuous process with periodic re-inspections and subsequent actions, when necessary. These activities should be documented, both for legal purposes and for determining if changes in hazard are occurring in individual trees.

The results of a hazardous tree management program on the vegetative characteristics in a campground will depend on the levels of hazard deemed acceptable and the intensity of activity undertaken. An active program in many areas can result in a substantial loss of tree cover because of the number of hazardous trees. A greater vegetative component could be retained, at least for the short-term, by being conservative in selecting trees for removal for hazard reduction.

MANAGEMENT ALTERNATIVES

1. No Action. Vegetation management to the benefit of these recreation areas would not occur. Tree mortality beyond that which can be routinely expected will occur periodically from a combination of bark beetles, root disease, dwarf mistletoe and localized overstocking.

2. Vegetation Management. The proximity of the two camps would appear to require the development of one overall management plan for the area. This would require the establishment of objectives for the area and for the two campgrounds, which would include the desired future condition and appearance of

2. DeNitto, G., J. Kliejunas, B. Roettgering, and D. Schultz. 1988. Biological Evaluation of Pest Conditions in Developed Recreation Sites, Whiskeytown Unit, Whiskeytown-Shasta-Trinity National Recreation Area. USDA - Forest Serv., Pac. SW Reg., St. & Priv. Forestry, Forest Pest Mgt. Rept. No. 88-10. 19 p.

the vegetation. Vegetation management is a long-term commitment and cannot be accomplished through one-time events. Topics, to be considered include species composition, stocking levels, screening species, durability, regeneration, and

pest management actions. For some sites, desired future conditions may not be achievable with the existing conditions. In these situations, sites and facilities may need to be relocated to more suitable locations where the long-term conditions can be achieved[2]. In the present situation however, the extent and nature of the facilities indicates that vegetation management will have to work with most of the facilities where they presently exist.

PEST-SPECIFIC MANAGEMENT ACTIONS

1. Annosus Root Disease. A more uniform and extensive survey would define the number and location of all centers. Borax should be applied to stumps whenever conifers are cut.

2. Dwarf Mistletoe. A dwarf mistletoe control program could be initiated that includes prevention of new infections and improving the health of infected trees (Hawksworth ratings of 1-4) that are to be retained.

Control Options

a. No Action

Dwarf mistletoe will slowly spread and intensively in these stands and cause tree mortality. Jeffrey pines usually increase one infection class every 10 years and most severely-infected trees die within 10 to 15 years. In drought years, such as the ones we have had the last two years, the number of dead trees will increase.

b. Tree Removal

This requires removing the most heavily infected trees (Hawksworth rating of 5 or 6) from the stand. The use of this option may create some small opening in the canopy.

c. Branch Pruning

Branch pruning may be necessary to reduce the amount of dwarf mistletoe in the stand and reduce future spread. Trees with dwarf mistletoe ratings of 4 or more cannot be properly pruned and are normally removed.

d. Pruning of Witches' Brooms

The removal of witches' brooms will alleviate one of the more severe stresses on many of the trees. This will prolong individual tree life, but mistletoe infections will remain in the crown and continue to inoculate nearby trees. Broom pruning accepts the likelihood that understory trees will continue to deteriorate and is normally used where the understory is of little importance or non-existent.

e. Species Manipulation

Shifting to non-susceptible tree species is a variable alternative for uneven age stands. In El Camino Pines Camp and Camp St. Nicholas, pinyon pine and several hardwood species are resistant to western dwarf mistletoe, however,

not all sites may be suitable for these species. Another possibility would involve planting an identified source of dwarf mistletoe-resistant Jeffrey pine. Although the seed is from the central Sierra Nevada, seedlings have been test planted on the Cleveland National Forest and the Lake Tahoe Basin

Management Unit. A limited amount of seed is currently available from Dr. Robert Scharpf, PSW Station, Berkeley.

3. Armillaria Root Disease. Do not cut or kill oaks near conifers. If the oaks are young, cut and manage them for sprouts. Older oaks can be pruned to reduce transpiration and competition. Conifer stump removal (removal of innoculum) has been recommended in certain situations in the Pacific Northwest, but has not been tested in California.

4. Bark and Engraver Beetles. Proper thinning of dense aggregations of pine alleviates stress from inter-tree competition and leave trees are usually less susceptible to attack by bark beetles. Slash should be properly treated to prevent the buildup of pine engraver populations. High value trees can be protected with Sevin™ 50W or 80S.

5. Hazard Tree Management. If not already in place, a hazard tree management program would be an integral part of a vegetation management program.

DWARF MISTLETOE MANAGEMENT

The next step in managing for dwarf mistletoe on El Camino Pines Camp and Camp St. Nicholas as well as Alamo Mountain (Report No. 85-24, 1985), Reyes Peak Campground and Mil Potrero Organizational Camp (Report No. 84-45, 1984) is to complete a detection survey for each area or campground. The reasons for the survey are to map the boundaries of infestation and gather enough information to make decisions for treatment. Information required includes tree species, dbh, stocking, site index, and mistletoe rating.

State and Private Forestry, Forest Pest Management may be able to help pay for presuppression surveys designed to gather dwarf mistletoe information and for subsequent suppression projects. When funding detection surveys, we assume the Forest and District are committed to use the information to develop strategies for reducing pest impact.

Please contact James Allison (415-556-9085) for additional information about:

1. Dwarf mistletoe control in recreation areas (copy enclosed).
2. Request for survey funds (From 3400-2 is required; copy enclosed).
3. Survey design.
4. Obtaining resistant Jeffrey pine seedlings.

DWARF MISTLETOE CONTROL IN RECREATION AREAS

Forest Pest Management

The progressive effects of dwarf mistletoe on trees are not dramatic or immediately obvious to the casual observer but take place over a long period of time. Control projects, therefore, are investments in the future health of campground trees, and we encourage land managers to consider the benefits of treatment. Thorough and aggressive projects can be very successful in reducing mortality and infection levels while increasing tree vigor and longevity.

Control alternatives

Dwarf mistletoe treatments may include one or any combination of the following:

1. Removing infected overstory trees to protect regeneration.
2. Removing witches' brooms to prolong tree life.
3. Removing all infections by pruning to eliminate the parasite.
4. Removing heavily infected trees that cannot be successfully pruned.
5. Thinning to remove infected trees and release residual trees.
6. Destroying heavily infected stands or aggregations and then regenerating.
7. Creating buffer strips to prevent re-entry of dwarf mistletoe.
8. Favoring resistant species (includes planting).

Estimated effects of dwarf mistletoes

Field observations and studies involving ponderosa and Jeffrey pines in California, Nevada and Arizona recreation areas have produced several generalizations to help estimate the future effects of dwarf mistletoe on individual trees and the expected benefits of treatment. Pines with dwarf mistletoe ratings of 1 through 4 will normally advance to the next higher class in about 10 years. Trees with ratings of 5 or 6 will probably die within 10 to 15 years and are prime targets for insect attack. Removal of all mistletoe infections (within the limits described below) should allow a tree to reach normal maturity, and removal of just witches' brooms from moderately infected trees may increase its life by 10 to 20 years.

Control procedures and guidelines

The first step in control project for campgrounds is to map the areas of infestation. Then each infected tree and the area around it must be examined to decide whether to remove the mistletoe or to remove the entire tree. The

enclosed Dwarf Mistletoe Survey Data Sheet (page 4) may be used to help determine individual tree treatments and to estimate project costs. In making these decisions and planning a project the guidelines below should be used. High-value trees and special situations may require deviation from these generalizations. However, deviations should be kept to a minimum in order to maintain treatment effectiveness.

1a. Trees with a dwarf mistletoe rating (DMR) of 3 or less - prune off all lower branches, both healthy and diseased, at the bole up to and including the second whorl of branches above the highest visible mistletoe infection. Experience has shown that removing branches only up to the highest infection or even one more whorl almost certainly results in latent infections appearing in 3-5 years.

b. Trees with a DMR or 4, and no mistletoe in the upper 1/3 of crown - prune to remove infections or take tree out depending on the condition of crown, tree vigor, distribution of mistletoe and importance of tree.

c. Trees with a DMR of 5 or 6 - remove; in special situations these may be broom pruned.

2. A tree should have at least 30% live crown after pruning.

3. Whenever possible avoid removing more than 50% of a tree's live crown.

4. Bole infections - if the stem diameter at the point of infection is less than 6 inches, remove the tree. Bole infections are not serious from the standpoint of spreading mistletoe, but they deform and/or lead to mortality of small trees and failure of large trees.

5. Branches 1 inch or less in diameter with mistletoe plants within 6 inches of the bole are not prunable because the parasite is probably already in the bole. For each 1-inch increase in branch diameter, the minimum safe distance for pruning increases 2 inches. For example, the minimum safe pruning distance from the bole to mistletoe plants for branches 1 to 2 inches in diameter in 8 inches.

6. Removing witches' brooms from high-value trees will increase the vigor and longevity of those trees. It may not be possible or acceptable to remove all remaining branch infections, and this means that a source of mistletoe seed is still in the crown.

7. Some infections may be left in desirable isolated trees where there are no susceptible trees within range of remaining mistletoe shoots/seeds. This is often the case when broom pruning is used.

8. In very dense aggregations it is often best to thin out infected trees even though they are prunable. Make decisions based on tree vigor, spacing, and expected response of residual trees.

9. Buffer zones, defined as areas free of susceptible hosts, are essential to prevent mistletoe from re-entering the control area. Examples include meadows, roads, rivers, clearings and plantations of non-host trees. Construction of new roads, structures or campsites can also be used to create buffer zones.

10. Green pine slash generated by pruning or tree removal should be treated to reduce the risk of pine engraver (Ips spp.) buildup. Slash created in the spring or early summer should be lopped and scattered, piled and burned while green, chipped, or removed from the site.

11. Treat all freshly cut stump surfaces with borax to prevent the establishment of Fomes annosus root disease.

12. Definitely plan to re-enter and treat the campgrounds in 3 to 5 years to remove previously undetected latent infections. Dwarf mistletoe can seldom be eliminated with one entry.

13. A post-suppression evaluation is essential to monitor project effectiveness and thoroughness. This evaluation should be designed before ground work is begun and completed soon after treatment is finished. Completing the Dwarf Mistletoe Survey Data Sheet can help document treatment effectiveness.

FOREST PEST MANAGEMENT SUPPRESSION FUNDS

FPM expects to have dwarf mistletoe control funds for the current fiscal year. If the District decides to request suppression dollars, the following must be submitted to FPM for approval:

- a project proposal, Form FS-3400-2;

- an environmental assessment that includes project objectives, a copy of this evalutation, a project work plan, an analysis of economic efficiency (FSM 1970 and 3433) and a post-suppression evaluation plan.

At your request, the FPM Staff is available to provide whatever assistance or additional information they can for satisfying these requirements. We suggest that prior to beginning any preparation of a project proposal, our staff should meet with Forest/District personnel to go over actual dwarf mistletoe field situations and appropriate treatment strategies. In addition, plans for a post-suppression evaluations and approaches to an economic analysis can be discussed.

DWARF MISTLETOE SURVEY DATA SHEET

Name of Unit/Area _____

Crew: A _____ Date: A _____

B _____ B. _____

			A. PRE-SUPPRESSION				B. POST-SUPPRESSION			
Tree No.	DBH	Species	% Live Crown	Hawksworth Rating[1]	Est. % Live Crown after Pruning	Action[2]	Hawksworth Rating[1]	% Live Crown	Photo Poi	
									Bear.	Di

[1]Enter rating for each one-third of crown from bottom to top, plus total score, e.g. 2-1-0 = 3

[2]Enter code for the following actions: L = Leave tree (no action)
R = Remove tree
P = Branch prune
B = Broom prune

Exhibit 1

HAWKSWORTH 6-CLASS MISTLETOE RATING SYSTEM

STEP 1: DIVIDE LIVE CROWN INTO THIRDS.

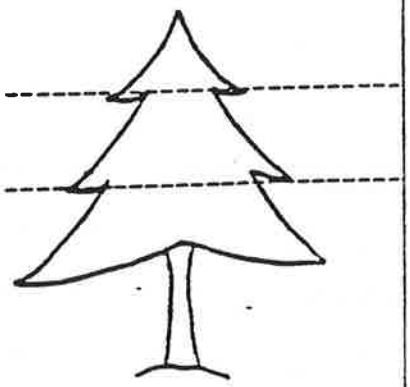
STEP 2: NOW, RATE EACH THIRD SEPARATELY. ASSIGN EACH THIRD EITHER 0, 1, OR 2 AS DESCRIBED BELOW:

(0) No visible infection.

(1) Light - Less than 1/2 of branches have mistletoe plants.

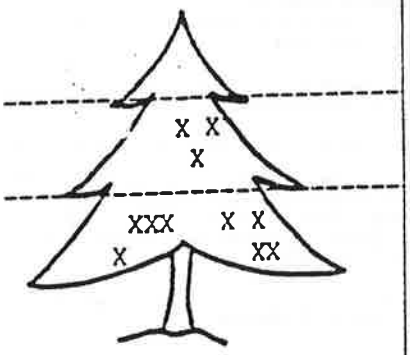
(2) Heavy - More than 1/2 of branches have mistletoe plants and/or brooms.

STEP 3: FINALLY, ADD RATINGS OF THIRDS TO OBTAIN TOTAL TREE RATING.



EXAMPLE

THIS 1/3 HAS NO VISIBLE INFECTION -- Rating	0
LESS THAN HALF OF THIS 1/3 IS INFECTED -- Rating	1
MORE THAN HALF OF THIS 1/3 IS INFECTED -- Rating	2
TOTAL RATING FOR TREE	3



RATING	INFECTION LEVEL
0	None
1 or 2	Light
3 or 4	Moderate
5 or 6	Heavy

USDA - Forest Service

FOREST PEST MANAGEMENT PROJECT PROPOSAL

(Ref: FSM 3400, Report FS-3400-E)

PART I – REQUESTING OFFICE USE ONLY

1. Region/Area	2. State	3. Fiscal Year	4. Causal Agent	5. Group	6. Landownership *(x appropriate box)* ☐ National Forest ☐ Other Federal

7. Type of Project *(x appropriate box)* ☐ Prevention ☐ Suppression	8. Status of Project *(x appropriate box)* ☐ New Project ☐ Continuing Project	9. Host Protected

10. Prevention/Suppression Method	11. Pesticide	12. Application Rate

13. Program Activities (a)	First Year Targets and Costs: Units of Work (b)	Unit Cost (c)	Total Planned Cost (d)	Funds Needed in Subsequent Years: FY: Estimated Cost (e)	FY: Estimated Cost (f)
(1) Pretreatment Survey (Acres)					
(2) Treatment (Acres)					
(3) Volume Treated (MBF)					
(4) Volume Removed (MBF)					
(5) Volume Protected (MBF)					
(6) Post-Treatment Evaluation (Acres)					
(7) Environmental Monitoring (Acres)					
(8) Other (Identify)					
(9) Subtotal					
(10) Indirect and service charges (Field) Percent of Subtotal (%)					
(11) Total Field Costs					

14. Proposed By *(Signature)*	15. Title	16. Date

PART II – REGION OR AREA USE ONLY

17. Region/Area Indirect and Service Charges Percent of Total Field Costs (. %)					
18. Total Project Costs					

19. Approved By *(Signature)*	20. Title	21. Project Number	22. Date

PART III – WASHINGTON OFFICE USE ONLY

23. Project Action *(x appropriate box)* ☐ Approved ☐ Disapproved	24. Total Funds Allocated			

25. Approved/Disapproved By *(Signature)*	26. Title	27. Date

28. Remarks

Previous edition is obsolete. (OVER) FS-3400-2 (11/82)